NAVAJO GENERATING STATION
P.O. Box 850
Page, AZ 86040
(928) 645-6217
Fax (928) 645-7298

ROBERT K. TALBOT
Manager

February 9, 2015

Mr. Gerardo C. Rios, Chief
Air Division Permits Office (AIR-3)
EPA Region IX
75 Hawthorne Street
San Francisco, CA 94105

RECEIVED
FEB 2015
NNEPA Operating
Permit Program

Re: Minor New Source Review Permit Application
Navajo Generating Station
Permit No. NN-ROP 05-06

Dear Mr. Rios:

Enclosed is a Minor New Source Review Permit application for the Salt River Project (SRP) Navajo Generating Station's (NGS) air quality permit. This application pertains to the proposed installation of a refined coal treatment system at NGS.

If you have any questions regarding this application submittal, please contact Kyle Heckel at (602) 236-5493 or Paul Ostapuk at (928) 645-6577.

Sincerely,

Robert Talbot, Manager
Navajo Generating Station

cc w/attachment: Scott Bohning, EPA Region IX
Charlene Nelson, NNEPA
Eric Massey, ADEQ (affected state)
Paul Ostapuk, NGS
LOC 6-2-6

Navajo Generating Station Minor New Source Review Permit Application

Salt River Project
1521 North Project Drive
Tempe, Arizona 85281

SRP®

February 2015

Table of Contents

List of Appendices

1.0 Executive Summary

The Navajo Generating Station (NGS) is a pulverized coal steam electric generating facility that is operated by the Salt River Project Agricultural Improvement and Power District (SRP). The facility is located in the Navajo Nation approximately 5 miles east of Page, Arizona.

NGS consists of three generating units, designated as Units 1, 2, and 3, which produce a combined electrical output of 2,250 net megawatts (MW). Units 1, 2, and 3 became operational in stages between 1974 and 1976. While this facility is operated by SRP, it is owned by a consortium of groups which include:

- United States Bureau of Reclamation (24.3 percent);
- SRP (21.7 percent);
- Los Angeles Department of Water and Power (21.2 percent);
- Arizona Public Service Company (14.0 percent);
- Nevada Power (11.3 percent); and
- Tucson Electric Power (7.5 percent).

NGS is a major stationary source of air emissions and operates under Title V Permit Number NN-ROP-05-06 issued by the Navajo Nation Environmental Protection Agency (NNEPA). NGS is in a location designated as attainment or unclassifiable for all criteria pollutants.

With this application, SRP is proposing to install and operate a refined coal treatment system at NGS and is requesting a Minor New Source Review (NSR) permit to authorize the proposed change. SRP has determined that the proposed change will result in an increase in emissions of particulate matter (PM and PM_{10}) which exceeds the Federal Minor NSR thresholds defined under Title 40 of the Code of Federal Regulations (40 CFR) §49.153. As a result, the proposed project is considered a minor modification at an existing source and will require a Minor NSR Permit.

The following sections of this application contain all information required under 40 CFR §49.154.

2.0 Permit Application Forms

This section includes:

- Application for New Construction (Form NEW)

OMB Control No. 2060-0003
Approval expires 04/30/2012

United States Environmental Protection Agency Region IX, Air Division 75 Hawthorne Street San Francisco, CA 94105 Phone (415) 947-3579 Fax http://www.epa.gov/region9/air/tribal/index.html	*Reviewing Authority* *Program* *Address* *Phone* *Fax* *Web address*

FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form:

- ☐ **Proposed Construction of a New Source**
- ☒ **Proposed Construction of New Equipment at an Existing Source**
- ☐ **Proposed Modification of an Existing Source**
- ☐ **Other – Please Explain**

Please submit information to:

[Reviewing Authority
Address
Phone]

A. GENERAL SOURCE INFORMATION

1. (a) **Company Name** Salt River Project Agricultural Improvement and Power District (b) **Operator Name** Salt River Project Agricultural Improvement and Power District		2. **Source Name** Navajo Generating Station	
3. Type of Operation Fossil Fuel Electric Power Generation		4. Portable Source? ☐ Yes ☒ No 5. Temporary Source? ☐ Yes ☒ No	
6. NAICS Code 221112		7. SIC Code 4911	
8. Physical Address (home base for portable sources) 5 miles east of Page, Arizona, off U.S. Highway 98			
9. Reservation* Navajo Nation	10. County* Coconino	11a. Latitude* 36° 54' 17.633" N	11b. Longitude* 111° 23' 18.474" W
12a. Quarter Quarter Section*	12b. Section* 35&36	12c. Township* 41	12d. Range* 9E

*Provide all proposed locations of operation for portable sources

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this source. Provide as an attachment if additional space is necessary)

Source Name on the Permit Navajo Generating Station
Permit Number (xx-xxx-xxxxx-xxxx.xx) AZ 08-01A
Date of the Permit Action February 6, 2012

Source Name on the Permit Navajo Generating Station
Permit Number (xx-xxx-xxxxx-xxxx.xx) NN-ROP-05-06
Date of the Permit Action July 3, 2008

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

C. CONTACT INFORMATION

Company Contact Salt River Project Agricultural Improvement and Power District	Title
Mailing Address P.O. Box 52025, PAB 352, Phoenix, AZ 85072-2025	
Email Address	
Telephone Number (928) 645-8811	Facsimile Number
Operator Contact (if different from company contact)	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
Source Contact Paul Ostapuk	Title O&M Manager, Environmental
Mailing Address P.O. Box 850, Page, AZ 86040	
Email Address Paul.Ostapuk@srpnet.com	
Telephone Number (928) 645-6577	Facsimile Number
Compliance Contact Kyle Heckel	Title Environmental Engineer
Mailing Address P.O. Box 52025, PAB 352, Phoenix, AZ 85072-2025	
Email Address Kyle.Heckel@srpnet.com	
Telephone Number (602) 236-5493	Facsimile Number

D. ATTACHMENTS

Include all of the following information (see the attached instructions)

☒ **FORM SYNMIN** - New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.

☒ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.

☒ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.

☒ A list and descriptions of all proposed emission units and air pollution-generating activities.

☒ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.

☒ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.

☒ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.

☒ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.

☒ **Criteria Pollutant Emissions** - Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

These estimates are to be made for each emission unit, emission generating activity, and the project/source in total.

☒ **Modeling – Air Quality Impact Analysis (AQIA)**

☒ **ESA (Endangered Species Act)**

☒ **NHPA (National Historic Preservation Act)**

E. TABLE OF ESTIMATED EMISSIONS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Source

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)	
PM			PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SOx - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}			
$PM_{2.5}$			
SO_x			
NO_x			
CO			
VOC			
Pb			
Fluorides			
H_2SO_4			
H_2S			
TRS			
RSC			

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Source or Modification of an Existing Source

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM	See Appendix B	for required inf	ormation	
PM_{10}				
$PM_{2.5}$				
SO_x				
NO_x				
CO				
VOC				
Pb				
Fluorides				
H_2SO_4				
H_2S				
TRS				
RSC				

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SOx - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

3.0 Project Description

NGS currently operates several belt conveyors, as part of their coal handling operations, which transport coal from railcar unloading operations and coal storage piles to coal pulverizers for subsequent combustion in the boilers. Two of those belt conveyors, BC-8A and BC-8B, transfer coal from the surge bin located in the coal yard to the plant bin located in the power block.

With this application, NGS is proposing to install a refined coal system as part of the coal handling operations at the facility. With the proposed system, untreated coal will be diverted from BC-8A and BC-8B using a conveyor belt plow and transferred to two new Refined Coal Facility (RCF) feed belt conveyors (BC-11A and BC-11B). BC-11A and BC-11B will then transport the untreated coal to two mixing pugmills where calcium bromide and cement kiln dust will be applied. The treated coal will then be transferred onto two RCF product belt conveyors (BC-12A and BC-12B) where it is returned to BC-8A and BC-8B. The refined coal system will be designed to process approximately 3,200 tons of coal per hour.

Calcium bromide will be delivered by truck and stored in an 8,700 gallon storage tank and two 405 gallon day tanks. Cement kiln dust will also be delivered by truck and stored in three 150 ton silos and two 20 ton day bins. The refined coal system will consume approximately 45 gallons per hour of calcium bromide and 4 tons per hour of cement kiln dust.

Particulate emissions from the new coal handling operations will be collected and controlled by two dust collection and filtering systems (DC-12 and DC-13). Additionally, the cement kiln dust silos and day bins will be equipped with baghouses (DC-14 through DC-18).

For reference, a process flow diagram identifying all proposed processing and emission control equipment associated with the refined coal system is contained in Appendix A.

4.0 Regulatory Applicability Analysis

4.1 PSD and Minor NSR

Because NGS is located in an area classified as attainment or unclassifiable for all criteria pollutants and is located on Tribal Land, the proposed project must be evaluated for applicability to the Federal Prevention of Significant Deterioration (PSD) program as well as the Federal Minor New Source Review (NSR) Program in Indian Country.

The PSD program defines a major stationary source as: (1) any source type belonging to a list of 28 source categories that has a potential to emit (PTE) of 100 tons per year (tpy) or more of any conventional (or criteria) pollutant regulated under the federal Clean Air Act (CAA); or (2) any other source type with a PTE of 250 tpy of any pollutant regulated under the CAA. NGS belongs to one of the 28 listed source categories (fossil-fuel boilers, combinations thereof, totaling more than 250 MMBtu per hour heat input) and is considered an existing major stationary source because the PTE for nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOC), and particulate matter less than 10 microns in diameter (PM_{10}) exceeds 100 tpy.

Under the PSD program, for an existing major stationary source, a modification is considered major if the net emissions increase is equal to or greater than the corresponding significant emissions increase threshold for each respective pollutant, as defined in 40 CFR 51.166(b)(23).

Under the Minor NSR program, for an existing major stationary source, a modification is considered a minor modification if is not subject to the PSD program but has a net emissions increase that is equal to or greater than the corresponding minor NSR thresholds for each pollutant, as defined in 40 CFR 49.153 Table 1.

Information related to the net emissions increase at NGS for the pollutants affected by the project are listed in Table 4.1. Based on the changes proposed, the project is not considered a major modification under the PSD program. The proposed project however is subject to the minor NSR program, as it exceeds the minor NSR thresholds for PM and PM_{10}.

Table 4.1: Net Emissions Increase and PSD and Minor NSR Applicability Analyses

Pollutant	Net Emissions Increase* (tpy)	PSD Significance Level (tpy)	PSD?	Minor NSR Threshold (tpy)	Minor NSR?
PM	13.88	25	No	10	Yes
PM_{10}	9.88	15	No	5	Yes
$PM_{2.5}$	0.74	10	No	3	No

*Net emission increase methodology contained in Section 5. Detailed calculations are provided in Appendix B of this application.

NGS is submitting this application in accordance with the Minor NSR permitting requirements under 40 CFR Part 49.154.

4.2 NSPS Subpart Y

New Source Performance Standard (NSPS) Subpart Y (Coal Preparation and Processing Plants) is applicable to various affected facilities, which have commenced construction after October 27, 1974, located at coal preparation and processing plants that process more than 200 tons of coal per day. Per 40 CFR 60.251(e), coal preparation and processing plant is defined as "*any facility (excluding underground mining operations) which prepares coal by one or more of the following processes: breaking, crushing, screening, wet or dry cleaning, and thermal drying*". NGS receives its coal pre-processed and does not prepare coal using any breaking, crushing, screening, wet or dry cleaning, and thermal drying process. As a result, NGS is not considered a coal preparation and processing plant and the proposed coal handling equipment associated with the proposed project are not subject to NSPS Subpart Y.

4.3 Air Quality Impact Analysis

The Minor NSR regulations under 40 CFR 49.154(d) indicate that an air quality impact analysis (AQIA) may be required if the reviewing authority has reason to be concerned that the construction of the project would cause or contribute to a NAAQS or PSD increment violation. For the proposed project, an AQIA analysis was conducted for PM_{10} and $PM_{2.5}$. Since there is no NAAQS or PSD increment for PM, it was not included in the AQIA.

Results of the AQIA indicated that the maximum concentrations of PM_{10} and $PM_{2.5}$ resulting from the project are below their respective Significant Impact Levels (SILs). Therefore, the proposed project will not cause or contribute to a NAAQS or PSD increment violation. Details of the methodologies used in the AQIA and the results are included in the Refined Coal Project Modeling Protocol and Report contained in Appendix C.

4.4 Endangered Species Act

The Endangered Species Act of 1973 requires the examination of impacts to all federally listed threatened or endangered species and designated critical habitat caused by the proposed federal action in the action area. As discussed in Section 4.3, a modeling analysis was conducted to identify the maximum concentration of PM_{10} and $PM_{2.5}$ resulting from the proposed project. The results from the model identified that the maximum concentration occurs at the property fence line and is below the SILs for PM_{10} and $PM_{2.5}$. Since emissions from the project are considered insignificant beyond the property fence line, the project (action) area for this evaluation was limited to the NGS property boundaries.

According to the United States Fish and Wildlife Service, there are 21 species in Coconino County that are listed as endangered, threatened, or candidate species (Table 4.2). There is no designated critical habitat within the project area. Based on the habitat conditions surrounding the project area, the only species from the Coconino County threatened and endangered species list expected to be in the vicinity of the project area is the California condor (*Gymnogyps californianus*). The California condor has been observed in Page, Arizona, and at Wahweap Marina, both approximately 5 miles west of the project area. No breeding or nesting was observed. California condors have not been observed within the NGS property boundary. NGS is a developed site that lacks breeding and foraging habitat for the species. Because no species from the threatened or endangered species list are expected to occur within the project area and no critical habitat is designated within the project area, no impacts to listed species or critical habitat are anticipated from the proposed project.

Table 4.2: Coconino County List of Threatened and Endangered Species

Group	Name	Status
Amphibians	Chiricahua leopard frog (*Rana chiricahuensis*)	Threatened
Birds	California condor (*Gymnogyps californianus*)	Endangered; Experimental Population, Non-Essential
Birds	Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened
Birds	Mexican spotted owl (*Strix occidentalis lucida*)	Threatened
Birds	Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered
Fishes	Humpback chub (*Gila cypha*)	Endangered
Fishes	Apache trout (*Oncorhynchus apache*)	Threatened
Fishes	Roundtail chub (*Gila robusta*)	Candidate
Fishes	Little Colorado spinedace (*Lepidomeda vittata*)	Threatened
Fishes	Razorback sucker (*Xyrauchen texanus*)	Endangered
Flowering Plants	Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*)	Endangered
Flowering Plants	Sentry milk-vetch (*Astragalus cremnophylax var. cremnophylax*)	Endangered
Flowering Plants	Navajo sedge (*Carex specuicola*)	Threatened
Flowering Plants	Brady pincushion cactus (*Pediocactus bradyi*)	Endangered
Flowering Plants	Siler pincushion cactus (*Pediocactus (=Echinocactus,=Utahia) sileri*)	Threatened
Flowering Plants	San Francisco Peaks ragwort (*Packera franciscana*)	Threatened
Flowering Plants	Welsh's milkweed (*Asclepias welshii*)	Threatened
Mammals	Black-footed ferret (*Mustela nigripes*)	Endangered; Experimental Population, Non-Essential
Reptiles	Northern Mexican gartersnake (*Thamnophis eques megalops*)	Threatened
Reptiles	Narrow-headed garter snake (*Thamnophis rufipunctatus*)	Threatened
Snails	Kanab ambersnail (*Oxyloma haydeni kanabensis*)	Endangered

4.5 National Historic Preservation Act

The National Historic Preservation Act requires that an evaluation of the project be conducted to ensure that there will be no impacts to cultural resources. For the proposed project, there will be no new land disturbances, as construction will occur only within the boundaries of the plant proper fence line on pre-disturbed land. NGS conducted an archeological evaluation of the entire plant site prior to construction of the facility in which there were no archeological findings[1]. With there being no new land disturbances, and the pre-disturbed land having been historically evaluated with no findings, no impacts to cultural resources are expected as a result of the proposed project.

4.6 Air Permit Status

NGS currently operates under a Title V permit (Permit Number NN-ROP-05-06) issued by Navajo Nation Environmental Protection Agency (NNEPA). The expiration date for this permit was July 3, 2013 unless a timely and complete renewal application was submitted at least 6 months, but not more than 18 months, prior to the date of expiration of the permit. SRP submitted a complete renewal application for this permit on January 3, 2012, which was within the specified timeframe for renewal application submittal. The NNEPA is currently processing the renewal application.

4.7 Compliance Status

SRP is currently in compliance with its air quality permit for NGS and will meet any additional applicable requirements that become effective during the permit term in a timely manner.

[1] Navajo Project Archeological Clearance, February 25, 1970, L.M. Alexander.

5.0 Emission Calculations

Several new emission sources will be installed as part of the proposed project. The new emission units are sources of particulate matter (PM, PM_{10}, and $PM_{2.5}$) and include the following:

- Dust collectors for coal handling operations (DC-12 and DC-13)
- Cement kiln dust silo baghouses (DC-14, DC-15, and DC-16)
- Cement kiln dust day bin baghouses (DC-17 and DC-18)
- Unpaved road emissions from cement kiln dust and calcium bromide deliveries

Additionally, the cement kiln dust being applied to the coal is expected to increase the ash content of the coal that is combusted in the boilers. As a result, an increase in actual emissions of PM, PM_{10}, and $PM_{2.5}$ from the boilers (U1, U2, and U3), which will be combusting the treated coal, is anticipated.

This section provides a summary of the methodologies used to calculate the potential emissions for the new sources, the increase in actual emissions from the affected sources, and the total net emissions increase resulting from the proposed project. Because NGS is not seeking an increase in potential emissions from existing sources, and potential emissions from existing sources are not necessary for evaluating applicability to the PSD and Minor NSR programs, they are not included in this evaluation.

4.1 New Emission Sources

4.1.1 Dust Collectors (DC-12 and DC-13)

The proposed project includes the installation of several coal belt conveyors, which will be controlled by two dust collectors. Potential emissions from the dust collectors are calculated using flow rate and particulate grain loading rates for standard filters based on manufacturer specification data and assuming 8,760 hours of operation per year. Detailed emission calculations for the dust collectors are included in Table B.1 of Appendix B. The potential emissions calculated in Table B.1 are subsequently used in the net emission increase evaluation used for PSD and Minor NSR applicability determinations.

While the potential emissions used in the net emissions increase evaluation are calculated using particulate grain loading rates for the standard filters that are considered integral to the operation of the system, NGS is voluntarily planning to install high efficiency filters. Detailed emission calculations using the high efficiency filters are included in Table B.2 of Appendix B.

4.1.2 Baghouses (DC-14 through DC-18)

The proposed project also includes the installation of three silos and two day bins for storing cement kiln dust. PM emissions from the storage silos and day bins will be controlled by baghouses that are considered integral to the systems operation. Potential emissions for the baghouses are calculated using flow rate and particulate grain loading rates based on manufacturer specification data and assuming 8,760 hours of operation per year. Detailed emission calculations for the baghouses are included in Table B.1 of Appendix B.

4.1.3 Unpaved Roads

As part of the proposed project, the refined coal operation will receive regular deliveries of calcium bromide and cement kiln dust. The delivery trucks will drive on unpaved roads located within the property boundary, which will be a source of fugitive particulate matter emissions. Potential emissions from the unpaved roads were calculated using vehicle specific information and emission factors from AP-42 Section 13.2.2 (Fugitive Dust from Vehicles Traveling on Unpaved Roads). Detailed emission calculations for the unpaved road fugitive emissions are included in Table B.3 of Appendix B.

4.2 Existing Affected Emission Sources

Because the proposed project will be applying cement kiln dust to the coal, the ash content of the coal is expected to increase. Consequently, an increase in actual emissions of PM, PM_{10}, and $PM_{2.5}$ from the boilers that will be combusting the treated fuel is anticipated. Emission factors representing the increase in emissions from the additional ash content were calculated using the increase in ash content due to the application of cement kiln dust and methodologies contained in AP-42 Section 1.1 (Bituminous and Subbituminous Coal Combustion).

To identify the net increase in emissions, the emission factors for the increased ash content were multiplied by the average historic coal combustion rate for each unit over the 24-month period of January 2012 through December 2013. NGS does not anticipate that there will be an increase in annual coal combustion rates as a result of this project. As a result, the net emissions increase evaluation is consistent with the actual-to-projected-actual evaluations required for determining applicability to the PSD and Minor NSR programs. Detailed emission calculations for the affected sources are included in Tables B.4 and B.5 of Appendix B.

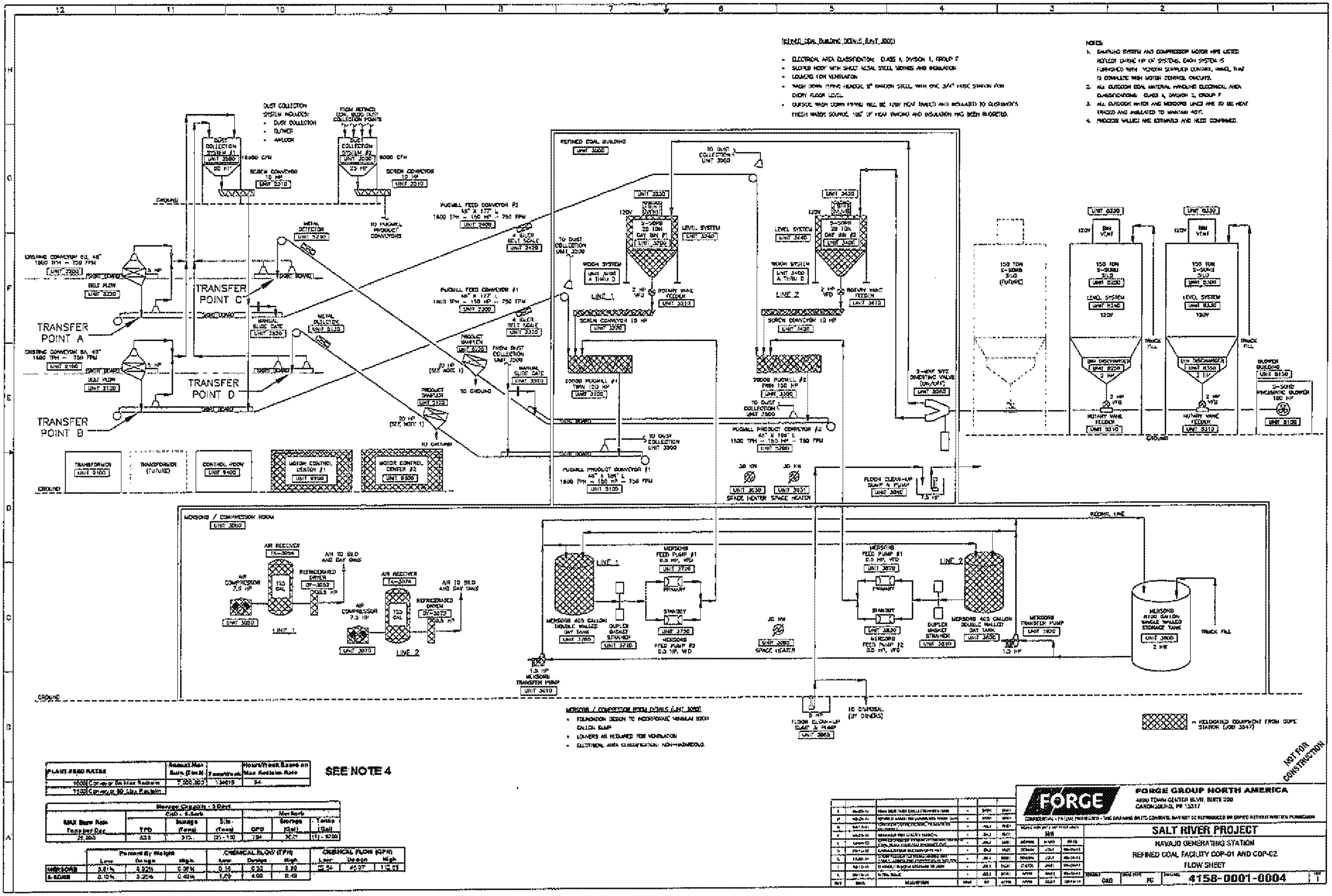
4.3 Net Emissions Increase

The net emissions increase from the proposed project was calculated by summing the potential to emit for each new source and the increase in emissions from the existing affected emission sources. The total net emissions increase from the project is included in Table B.6 of Appendix B. The total net emissions increase from this evaluation was used for PSD and Minor NSR applicability determinations, as detailed in Section 4.1.

Because NGS is voluntarily planning to install high efficiency filters on the dust collectors, a separate net emissions increase summary, using the high efficiency filters, is provided in Table B.7 of Appendix B. The emission rates included in Table B.7 are used in the AQIA.

APPENDIX A

Process Flow Diagram



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APPENDIX B

Emission Calculations

Table B.1: Emissions from Dust Collection Systems

Emission Point	Description	Control Device	Flow Rate (acfm)	PM EF[1] (gr/acf)	PM_{10} EF[1] (gr/acf)	$PM_{2.5}$ EF[1] (gr/acf)	PM Emissions		PM_{10} Emissions		$PM_{2.5}$ Emissions	
							(lb/hr)[2]	(tons/yr)[3]	(lb/hr)[2]	(tons/yr)[3]	(lb/hr)[2]	(tons/yr)[3]
Coal Handling												
DC-12	Coal Handling Dust Collection System	Dust Collector	16,500	1.00E-02	1.00E-02	5.30E-04	1.4143	6.19	1.4143	6.19	0.0750	0.3283
DC-13	Coal Handling Dust Collection System	Dust Collector	6,000	1.00E-02	1.00E-02	5.30E-04	0.5143	2.25	0.5143	2.25	0.0273	0.1194
Cement Kiln Dust Handling												
DC-14	Cement Kiln Dust Silo 1	Baghouse	450	2.50E-04	2.50E-04	1.33E-05	0.0010	0.004	0.0010	0.004	0.0001	0.0002
DC-15	Cement Kiln Dust Silo 2	Baghouse	450	2.50E-04	2.50E-04	1.33E-05	0.0010	0.004	0.0010	0.004	0.0001	0.0002
DC-16	Cement Kiln Dust Silo 3	Baghouse	450	2.50E-04	2.50E-04	1.33E-05	0.0010	0.004	0.0010	0.004	0.0001	0.0002
DC-17	Cement Kiln Dust Day Bin 1	Baghouse	1,200	2.00E-03	2.00E-03	1.06E-04	0.0206	0.09	0.0206	0.090	0.0011	0.0048
DC-18	Cement Kiln Dust Day Bin 2	Baghouse	1,200	2.00E-03	2.00E-03	1.06E-04	0.0206	0.09	0.0206	0.090	0.0011	0.0048
Total Emissions from Dust Collection Systems							1.97	8.64	1.97	8.64	0.10	0.46

1) Emission factors based on manufacturers' data (see Appendix D) and assuming 5.3% PM2.5 (EPA AP-42 page 13.2.4-4)

2) Emissions (lb/hr) = Flow Rate (acfm) x Emission Factor (gr/acf) x (lb/7,000 grain) x (60 min/hr)

3) Emissions (tons/yr) = Emissions (lb/hr) x 8,760 hr/yr x (1 ton/2,000 lb)

Table B.2: Emissions from Dust Collection Systems w/ High Efficiency Filters

Emission Point	Description	Control Device	Flow Rate (acfm)	PM EF[1] (gr/acf)	PM_{10} EF[1] (gr/acf)	$PM_{2.5}$ EF[1] (gr/acf)	PM Emissions		PM_{10} Emissions		$PM_{2.5}$ Emissions	
							(lb/hr)[2]	(tons/yr)[3]	(lb/hr)[2]	(tons/yr)[3]	(lb/hr)[2]	(tons/yr)[3]
Coal Handling												
DC-12	Coal Handling Dust Collection System	Dust Collector	16,500	3.00E-03	3.00E-03	1.59E-04	0.4243	1.86	0.4243	1.86	0.0225	0.10
DC-13	Coal Handling Dust Collection System	Dust Collector	6,000	3.00E-03	3.00E-03	1.59E-04	0.1543	0.68	0.1543	0.68	0.0082	0.04
Total Emissions from Dust Collection Systems							0.58	2.53	0.58	2.53	0.03	0.13

1) Emission factors based on manufacturers' data for high efficiency filters (see Appendix D) and assuming 5.3% PM2.5 (EPA AP-42 page 13.2.4-4)

2) Emissions (lb/hr) = Flow Rate (acfm) x Emission Factor (gr/acf) x (lb/7,000 grain) x (60 min/hr)

3) Emissions (tons/yr) = Emissions (lb/hr) x 8,760 hr/yr x (1 ton/2,000 lb)

Table B.3: Unpaved Road Emissions

Emission Unit ID	Unit Description	Weight per Vehicle (tons)[1]	VMT/Round Trip	Total Annual Deliveries	Max VMT/hr	Total VMT/Year	PM Emission Factor (lb/VMT)[2]	PM_{10} Emission Factor (lb/VMT)[2]	$PM_{2.5}$ Emission Factor (lb/VMT)[2]	PM Emissions (lb/hr)[3]	PM Emissions (tons/yr)[4]	PM_{10} Emissions (lb/hr)[3]	PM_{10} Emissions (tons/yr)[4]	$PM_{2.5}$ Emissions (lb/hr)[3]	$PM_{2.5}$ Emissions (tons/yr)[4]
TR	Cement Kiln Dust Deliveries	74	1.0	720	1.0	720	2.85	0.73	0.07	2.85	1.0	0.7	0.3	0.1	0.0
TR	Calcium Bromide Deliveries	33	1.0	70	1.0	70	1.98	0.51	0.05	1.98	0.1	0.5	0.02	0.1	0.0
Total										4.83	1.09	1.25	0.28	0.12	0.03

1) Assume average half full.

2) Emission factors based on AP-42, Section 13.2.2 (11/06) - Fugitive Dust From Vehicles Traveling on Unpaved Roads

E_{PM} (lb/VMT) = $k(s/12)^a(W/3)^b(100\%-CE)$, where k=4.9, a=0.7, b=0.45

E_{PM10} (lb/VMT) = $k(s/12)^a(W/3)^b(100\%-CE)$, where k=1.5, a=0.9, b=0.45

$E_{PM2.5}$ (lb/VMT) = $k(s/12)^a(W/3)^b(100\%-CE)$, where k=0.15, a=0.9, b=0.45

s = surface material silt content (%) = 5.1 (from Table 13.2.2-1)

W = mean vehicle weight (tons)

CE = control efficiency from road watering (75% from Figure 13.2.2-2 assuming a moisture ratio of 2)

3) $PM/PM_{10}/PM_{2.5}$ Potential to Emit (lb/hr) = Total Vehicle Miles Traveled per Year (VMT/yr) x $PM/PM_{10}/PM_{2.5}$ Emission Factor (lb/VMT) x (1 yr / 8,760 hrs)

4) $PM/PM_{10}/PM_{2.5}$ Potential to Emit (tons/yr) = Total Vehicle Miles Traveled per Year (VMT/yr) x $PM/PM_{10}/PM_{2.5}$ Emission Factor (lb/VMT) x (1 ton / 2,000 lbs)

Table B.4: Emission Increase from Existing EGUs - Emission Factors

Coal Feed Rate - Unit 1[1]	264.87	tons/hr
Coal Feed Rate - Unit 2[1]	252.46	tons/hr
Coal Feed Rate - Unit 3[1]	271.59	tons/hr
Coal Ash Percentage Increase w/ Cement Kiln Dust	0.4	% by wt
Electrostatic Preciptator (ESP) Control Efficiency[2]	99.5	%
Flue Gas Desulfurizer (FGD) Control Efficiency[3]	94	%
Emission Factor: PM increase w/CKD, Controlled[4]	0.0012	lb/ton_{Coal}
Emission Factor: PM_{10} increase w/CKD, Controlled[4]	0.0003	lb/ton_{Coal}
Emission Factor: $PM_{2.5}$ increase w/CKD, Controlled[4]	0.0001	lb/ton_{Coal}

1) Coal feed rates based on hourly averages for the time period of 1/1/2012 thru 12/31/2013

2) ESP control efficiency based on manufactures specifications

3) FGD control efficiency based on EPA AP-42 , Section 1.1, Table 1.1-6 control efficiency for scrubber

4) Controlled Emission Factors calculated using the following uncontrolled factors from EPA AP-42, Section 1.1, Table 1.1-6

PM: 10A

PM_{10}: 2.3A

$PM_{2.5}$: 0.6A

Where A = Coal Ash Percentage

Controlled Emission Factor (lb/toncoal) = Uncontrolled Factor (lb/toncoal) * (1- ESP control efficiency) * (1 - FGD control efficiency)

Table B.5: Emission Increase from Existing EGUs - Analysis

		PM		PM_{10}		$PM_{2.5}$	
		lb/hr[1]	tpy[2]	lb/hr[1]	tpy[2]	lb/hr[1]	tpy[2]
Unit 1		0.3	1.39	0.1	0.32	0.0	0.08
Unit 2		0.3	1.33	0.1	0.31	0.0	0.09
Unit 3		0.3	1.43	0.1	0.33	0.0	0.09
Total		*0.9*	*4.1*	*0.2*	*1.0*	*0.1*	*0.3*

1) $PM/PM_{10}/PM_{2.5}$ Hourly Emissions (lb/hr) = Max Fuel Consumptions (tons/hr) x $PM/PM_{10}/PM_{2.5}$ Emission Factor (lb/ton_{coal})

2) $PM/PM_{10}/PM_{2.5}$ Annual Emissions (tons/yr) = $PM/PM_{10}/PM_{2.5}$ Hourly Emissions (lb/hr) x (8,760 hours/year) x (1 ton / 2,000 lbs)

Table B.6: Emission Summary Table - Net Emission Increase

Source	Unit Description	PM		PM_{10}		$PM_{2.5}$	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
New Sources							
DC-12	Coal Handling Dust Collection System	1.41	6.19	1.41	6.19	0.07	0.33
DC-13	Coal Handling Dust Collection System	0.51	2.25	0.51	2.25	0.03	0.12
DC-14	Cement Kiln Dust Silo 1	0.00	0.00	0.001	0.004	0.0001	0.0002
DC-15	Cement Kiln Dust Silo 2	0.00	0.00	0.001	0.004	0.0001	0.0002
DC-16	Cement Kiln Dust Silo 3	0.00	0.00	0.001	0.004	0.0001	0.0002
DC-17	Cement Kiln Dust Day Bin 1	0.02	0.09	0.02	0.09	0.00	0.00
DC-18	Cement Kiln Dust Day Bin 2	0.02	0.09	0.02	0.09	0.00	0.00
TR	Cement Kiln Dust Deliveries	2.85	1.03	0.73	0.26	0.07	0.03
TR	Calcium Bromide Deliveries	1.98	0.07	0.51	0.02	0.05	0.00
Affected Sources - Emission Increase							
U1	Boiler 1	0.32	1.39	0.07	0.32	0.02	0.08
U2	Boiler 2	0.30	1.33	0.07	0.31	0.02	0.09
U3	Boiler 3	0.33	1.43	0.07	0.33	0.02	0.09
Net Emission Increase		*7.75*	*13.88*	*3.44*	*9.88*	***0.29***	***0.74***

Table B.7: Emission Summary Table w/ High Efficiency Filters on Dust Collection Systems

Source	Unit Description	PM		PM_{10}		$PM_{2.5}$	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
New Sources							
DC-12	Coal Handling Dust Collection System	0.42	1.86	0.42	1.86	0.02	0.10
DC-13	Coal Handling Dust Collection System	0.15	0.68	0.15	0.68	0.01	0.04
DC-14	Cement Kiln Dust Silo 1	0.001	0.004	0.001	0.004	0.0001	0.0002
DC-15	Cement Kiln Dust Silo 2	0.001	0.004	0.001	0.004	0.0001	0.0002
DC-16	Cement Kiln Dust Silo 3	0.001	0.004	0.001	0.004	0.0001	0.0002
DC-17	Cement Kiln Dust Day Bin 1	0.02	0.09	0.02	0.09	0.00	0.00
DC-18	Cement Kiln Dust Day Bin 2	0.02	0.09	0.02	0.09	0.00	0.00
TR	Cement Kiln Dust Deliveries	2.85	1.03	0.73	0.26	0.07	0.03
TR	Calcium Bromide Deliveries	1.98	0.07	0.51	0.02	0.05	0.00
Affected Sources - Emission Increase							
U1	Boiler 1	0.32	1.39	0.07	0.32	0.02	0.08
U2	Boiler 2	0.30	1.33	0.07	0.31	0.02	0.09
U3	Boiler 3	0.33	1.43	0.07	0.33	0.02	0.09
Net Emission Increase		***6.40***	***7.97***	***2.09***	***3.96***	***0.22***	***0.43***

APPENDIX C

Refined Coal Project Air Dispersion Modeling Protocol and Report

AIR DISPERSION MODELING PROTOCOL AND REPORT

Refined Coal Project

Salt River Project - Navajo Generating Station

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Navajo Generating Station
Page, Arizona

January 2015

Project 140301.0104

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. INTRODUCTION

The Salt River Project Agricultural Improvement and Power District (SRP) operates the Navajo Generating Station (NGS) located approximately five miles east of Page in Coconino County, Arizona. The facility is classified as a major source with respect to PSD and Title V regulations.

SRP is planning to install a refined coal system as part of the coal handling operations at the facility. As part of this project, additional particulate matter (including PM_{10} and $PM_{2.5}$) emissions will be generated from various sources (e.g., unpaved roads, dust collectors, silos, etc.). No direct increase in emissions for any other criteria pollutants are expected from the project. Since NGS is located on tribal land, the proposed project will be subject to the EPA's Tribal Land Minor New Source Review (NSR) program. Based on the projected emission rate increase associated with the project, SRP is required to submit an air quality permit application pursuant to the procedures of Title 40 of the Code of Federal Regulations (40 CFR) § 49.154 for a minor modification at an existing source. As part of the project, an Air Quality Impact Analysis (AQIA) may be requested by the EPA to demonstrate that the proposed project will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) or PSD Increment.

This document presents an air quality modeling analysis to support the minor NSR permit application for the refined coal project. This report is prepared in accordance with the U.S. EPA Air Quality Modeling Guidelines[1] and describes the methodology followed and the results of the air quality impact analysis.

Impacts have been determined using the latest version of the American Meteorological Society (AMS) / Environmental Protection Agency (EPA) Regulatory Model, known as AERMOD.

1.1. NGS SITE LOCATION & AREA CLASSIFICATION

NGS is located approximately five miles east of Page in Coconino County, Arizona, which has the following classification relative to the NAAQS:[2]

- Attainment for:
  - Particulate matter (PM) or total suspended particulates (TSP); and
  - Sulfur dioxide (SO_2)
- Unclassifiable for:
  - Particulate matter with an aerodynamic diameter less than 10 microns (PM_{10});
  - Particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$);
  - Carbon monoxide (CO);
  - Ozone;
  - Nitrogen dioxides (NO_2); and
  - Lead (Pb)

Figure 1-1 provides the general location of the site with respect to the state of Arizona as well as surrounding cities and highways. An aerial photograph of NGS is provided in Figure 1-2, which also shows the fenceline for the site with respect to the surrounding area. Figures 1-3 and 1-4 are plot plans that show the location of the modeled emission sources and buildings/structures considered for downwash analysis. Note that all coordinates presented in the figures are established using the Universal Transverse Mercator (UTM) WGS84 coordinate system.

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[1] Code of Federal Regulations, Title 40-Protection of the Environment, Part 51, Appendix W.

[2] Per 40 CFR §81.303.

Figure 1-1. NGS Location Map

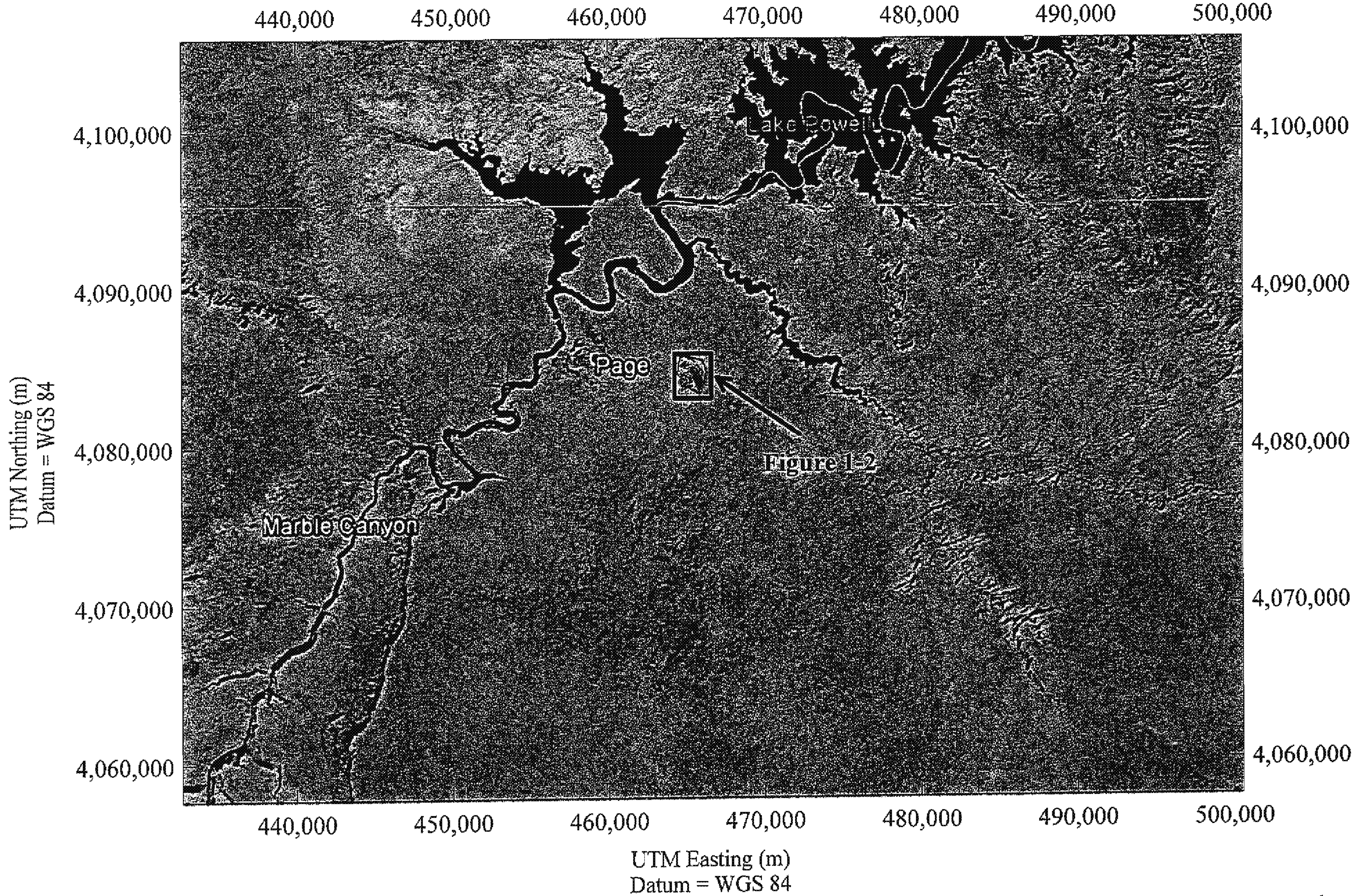


Figure 1-2. NGS Area Map

Figure 1-3. NGS Plot Plan

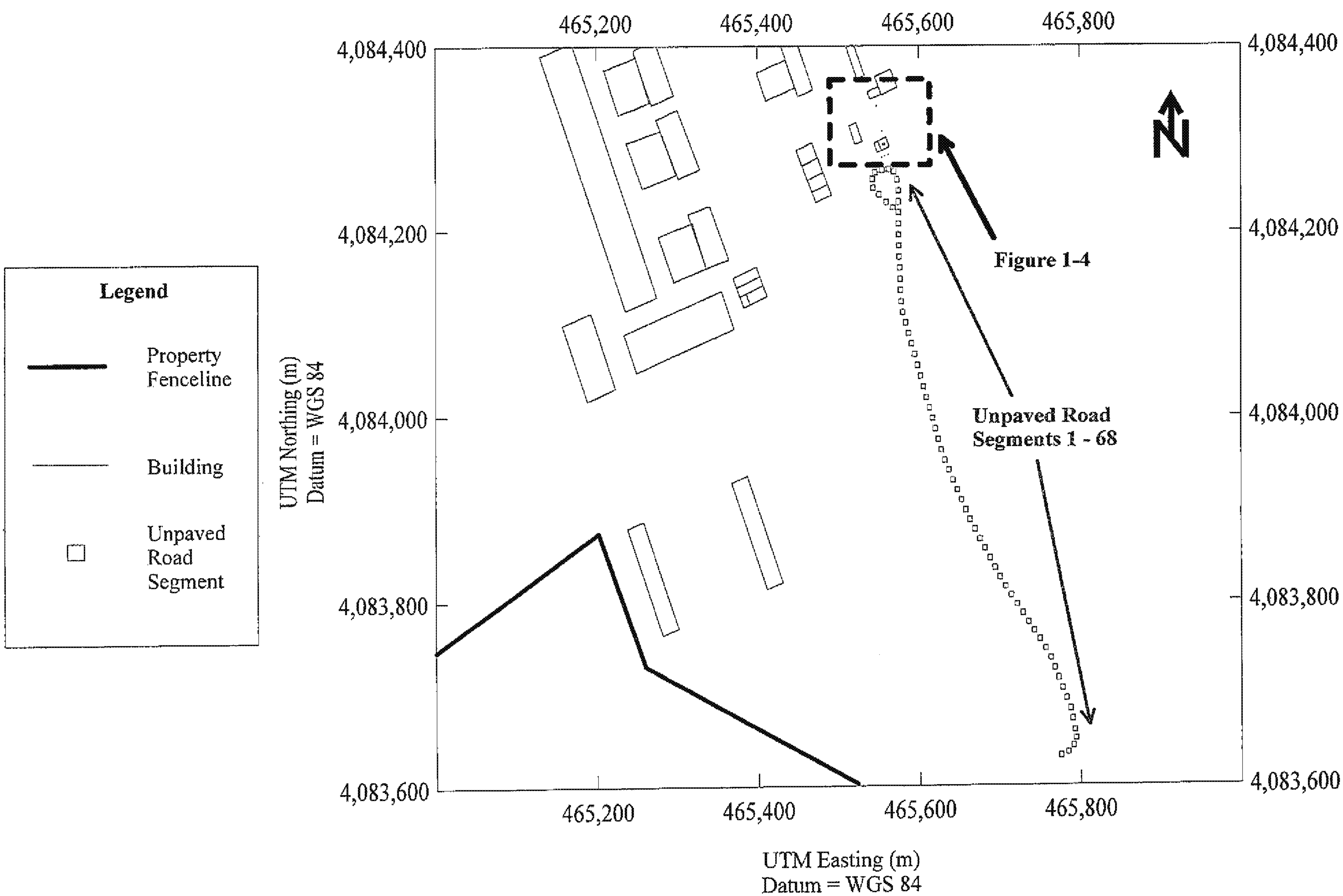
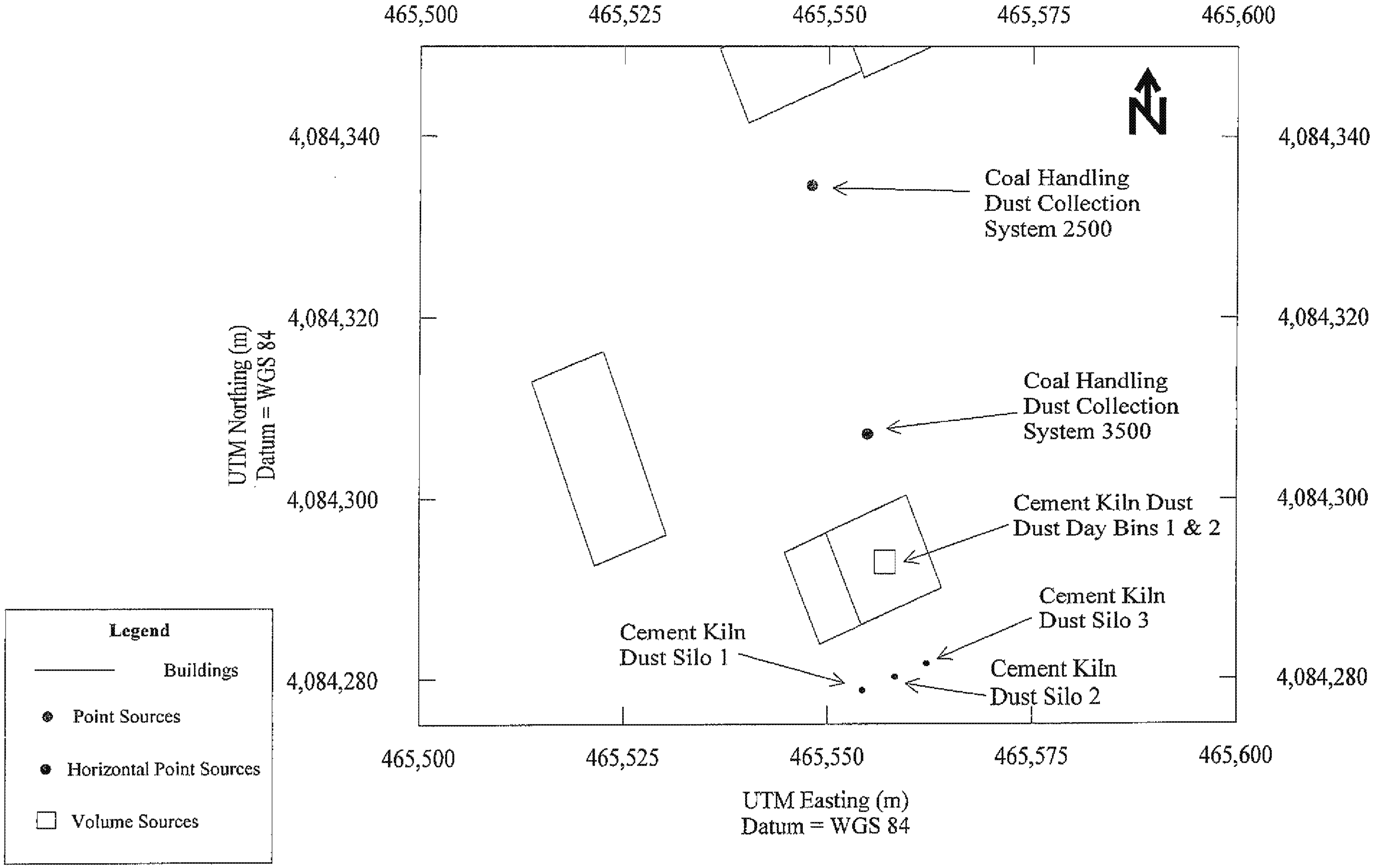


Figure 1-4. NGS Coal Handling Area



2. GENERAL AIR QUALITY DISPERSION MODELING APPROACH

2.1. SIGNIFICANT IMPACT ANALYSIS

Air quality dispersion modeling analyses contain two major sub-sections based on EPA modeling guidance: the Significant Impact Analysis and the Full Impact Analysis. Per EPA guidance, the Significant Impact Analysis considers the emissions associated only with the proposed project to determine whether they will have a significant impact upon the surrounding area. The modeled ground-level concentrations are compared to the corresponding significant impact levels (SILs) to determine whether any modeled ground-level concentrations at any receptor locations are greater than the SIL (i.e., "significant" receptors). If the Significant Impact Analysis reveals that modeled ground-level concentrations for a particular pollutant and averaging period are greater than the applicable SIL, a Full Impact Analysis (including both NAAQS and PSD Increment analyses) should be performed at the significant receptors.[3] Table 2-1 summarizes the SILs for each pollutant that was modeled.

Table 2-1. Significant Impact Levels

Pollutant	Averaging Period	Significant Impact Level (μg/m³)
$PM_{2.5}$	Annual	0.3
	24-hour	1.2
PM_{10}	Annual	1
	24-hour	5

In this modeling analysis, PM_{10} and $PM_{2.5}$ emission increases from the proposed project were evaluated to determine whether they have the potential for a significant impact upon the area surrounding the facility. All impacts were reported as the highest first high (H1H) of the modeled concentrations predicted at each receptor based on five years of meteorological data. The modeled ground-level concentrations were compared to the SILs for PM_{10} and $PM_{2.5}$. As discussed in Section 5, the maximum modeled ground-level concentrations for PM_{10} and $PM_{2.5}$ are below the SILs. Therefore, no Full Impact Analysis is needed and the proposed project will not cause any violation of any National Ambient Air Quality Standard (NAAQS) or PSD Increment.

2.2. $PM_{2.5}$ BACKGROUND CONCENTRATIONS

The $PM_{2.5}$ SIL has been vacated. However, per EPA's Draft Guidance for $PM_{2.5}$ Permit Modeling [4], no Full Impact Analysis is needed if the following two conditions are met:

- The differences between the NAAQS and background concentrations are greater than the $PM_{2.5}$ SIL; and
- The modeled concentrations from the project emission increases are below the $PM_{2.5}$ SILs.

Therefore, in this modeling analysis, the modeled $PM_{2.5}$ concentrations were compared with SILs and background concentrations for $PM_{2.5}$ were compared with NAAQS to ensure that the differences between NAAQS and background concentrations are greater than the SILs. The $PM_{2.5}$ background concentrations were obtained from the Glen Canyon ambient air monitoring site operated by SRP. This monitoring site is located 2.7 miles west of downtown Page, AZ and approximately 6 miles west of SRP NGS facility site. For both NGS facility site and the Glen Canyon monitoring site, the major PM sources are NGS facility and human activities at downtown

[3] Code of Federal Regulations, Title 40–Protection of Environment, Part 51, Appendix W.
[4] U.S. EPA, Draft Guidance for $PM_{2.5}$ Permit Modeling, March 4, 2013

Page. Considering the proximity between the two sites and the similarity of surrounding PM sources, the Glen Canyon monitoring site is considered representative for the background ambient air concentrations for NGS. Monitored data at Glen Canyon site for years 2010, 2011, and 2012 were obtained and used to calculate background $PM_{2.5}$ concentrations. Table 2-2 below shows background concentrations for $PM_{2.5}$ compared with NAAQS. As shown in Table 2-2, the differences between NAAQS and background concentrations are greater than the SILs.

Table 2-2. $PM_{2.5}$ Background Concentrations

Pollutant	Averaging Period	Background Concentration [1] (μg/m³)	NAAQS (μg/m³)	Difference between NAAQS and Background (μg/m³)	Significant Impact Level (μg/m³)
$PM_{2.5}$	Annual	2.52	12	9.48	0.3
	24-hour	7.26	35	27.74	1.2

[1] Annual background concentration is based on 3-year average of annual mean concentration for years 2010, 2011, and 2012. 24-hour background concentration is based on 3-year average of 98th percentile concentration for years 2010, 2011, and 2012.

3. MODEL OVERVIEW

This section contains a description of the model selection and the meteorological data, terrain data, building wake effects, and receptors that were used in the air dispersion modeling analysis.

3.1. DISPERSION MODEL SELECTION

On November 9, 2005, the U.S. EPA promulgated the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) for adoption into the *Guideline on Air Quality Models (Guidelines)*.[5] AERMOD includes a state-of-the-science downwash algorithm and utilizes AERMET, a meteorological data preprocessor that utilizes current planetary boundary layer (PBL) theory to calculate the dispersion coefficients (σ_y and σ_z).[6] The most current version of the AERMOD model (version 14134) was used in conducting the modeling analysis. The modeling was performed using the regulatory default option, except as discussed in the sections below, which includes the following:

- Stack-tip downwash; and
- A routine for processing averages when calm wind conditions occur or when meteorological data is missing.

3.2. METEOROLOGICAL DATA

EPA modeling guidance allows the use of five years of off-site meteorological data or at least one year of on-site meteorological data. In this analysis, five years of surface data from the nearby Page Municipal Airport and upper air data from the Flagstaff, AZ station were processed using AERMET to generate AERMOD ready meteorological data. Details are discussed in the following sections.

3.2.1. Surface Meteorological Data

The National Weather Service operates a surface monitoring station at the nearby Page Municipal Airport that records surface wind, temperature, and cloud cover data on an hourly basis. Given the close proximity of the Page weather station and NGS (less than 5 miles), the similar terrain features (elevated benches at both locations), and similar land cover at the Page Airport station and NGS facility, it can be concluded that the Page Airport is adequately representative of meteorological conditions at NGS. Data for years 2008 through 2012 were used.

Per EPA guidance, a meteorological database "*must be 90 percent complete (before substitution) in order to be acceptable for use in regulatory dispersion modeling*" and "*The 90 percent requirement applies on a quarterly basis such that 4 consecutive quarters with 90 percent recovery are required for an acceptable one-year data base.*"[7] The overall data completeness percentage for the 5 year meteorological data evaluated was 96.1% with quarterly values ranging from 93.5% to 99.8%.

[5] Code of Federal Regulations, Title 40-Protection of the Environment, Part 51, Appendix W.
[6] U.S. EPA, User's Guide for the AMS/EPA Regulatory Model-AERMOD, September 2004.
[7] EPA, 2000: Meteorological Monitoring Guidance for Regulatory Modeling Applications. U.S. Environmental Protection Agency, Research Triangle Park, NC.

3.2.2. Upper Air Data Processing

AERMET requires morning (12 GMT) sounding data from a representative upper air site to calculate mechanical mixing height and vertical potential temperature gradient. Upper air data for years 2008 through 2012 from the Flagstaff, AZ station were obtained and used in this analysis.

3.2.3. Land Use Analysis

A land use analysis was conducted for the area surrounding the Page Municipal Airport anemometer site using the AERSURFACE program to determine the surface roughness, albedo, and Bowen ratio values to be input to AERMET. Following the methodology used in a previous modeling study for NGS [8], it was assumed that dry, arid conditions will be for the entire five year period. The seasons are assigned as follows:

- Late autumn/winter without snow cover: December through March;
- Spring: April through June;
- Midsummer: July through August; and
- Autumn: October to November.

Land-use was characterized in two wind direction sectors based on the orientation of the Page Municipal Airport runway:

- Sector 1: 170 to 350 degrees from North; and
- Sector 2: 350 to 170 degrees from North.

National Land Cover Data 1992 (NLCD 92) obtained from the U.S. Geological Survey for the state of Arizona was input to AERSURFACE.

3.2.4. AERMET Processing

The EPA AERMOD program requires meteorological data preprocessed with the AERMET program. AERMET is a three-stage meteorological data processor that reads in data observations, performs quality checks, and derives additional micrometeorological parameters required by AERMOD. In addition to the traditional wind and temperature data, AERMOD uses a combination of data observations and theory to characterize the turbulence in the atmosphere, both at the surface and aloft. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the particular meteorological site. By providing raw surface and upper air station observation data to AERMET along with land use parameters, AERMOD model-ready data is created. AERMET generates both a surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD.

3.3. TERRAIN

The terrain elevation for each modeled receptor, building, and source was determined using the USGS National Elevation Dataset (NED). Specifically, the USGS NED 1 arc second file was used.

The terrain height for each modeled receptor was calculated using the AERMOD terrain processor (AERMAP version 11103). In addition to terrain elevation, an additional parameter called the hill height scale is required

[8] RTP Environmental Associates Inc., *Updated AERMOD Air Quality Modeling Report, Low NO_x Burner Project, Salt River Project, Navajo Generating Station, Page, Arizona*, 2011.

for each receptor to execute AERMOD's terrain modeling algorithms. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal and terrain-following states using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale is computed by the AERMAP terrain preprocessor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor.

The hill height scale does not represent the critical dividing streamline height itself, but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

According to Section 2.2.1 of the AERMOD Users Guide, the NED array boundary for AERMAP must include all terrain features that exceed a 10 percent elevation slope from any given receptor to properly calculate the hill height scale at each receptor.[9] The domain for the hill height analysis was set to the minimum coverage required for proper handling of elevation slope.

3.4. BUILDING WAKE EFFECTS (DOWNWASH)

The emission sources considered in this analysis were evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharge might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent. Plumes entrained in the zones of turbulence experience enhanced plume growth and restricted plume rise. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms using dimensions from the EPA's Building Profile Input Program (BPIP) for estimating for plumes affected by building wakes.

The effects of downwash are limited to stacks located within a distance defined as five times "L" of a structure, where "L" is the lesser of a structures height or direction-specific projected width. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. There are a total of 5 primary stacks that could be subject to the influence of downwash (two coal handling dust collection systems and three cement kiln dust silos).

The site layout has been reviewed to determine the buildings or structures that have stacks within 5L. The buildings or structures with stacks within 5L are included in the downwash analysis.

Direction-specific building dimensions and the dominant downwash structure parameters were determined using the *BREEZE*® BPIPP software, developed by Trinity Consultants, Inc. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274.[10]

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9 U.S. Environmental Protection Agency, *User's Guide for the AMS/EPA Regulatory Model – AERMOD*, Research Triangle Park, North Carolina, EPA-454/B-03-001, September, 2004.

10 U S. Environmental Protection Agency, *User's Guide to the Building Profile Input Program*, Research Triangle Park, NC, EPA-454/R-93-038.

3.5. RECEPTOR GRID

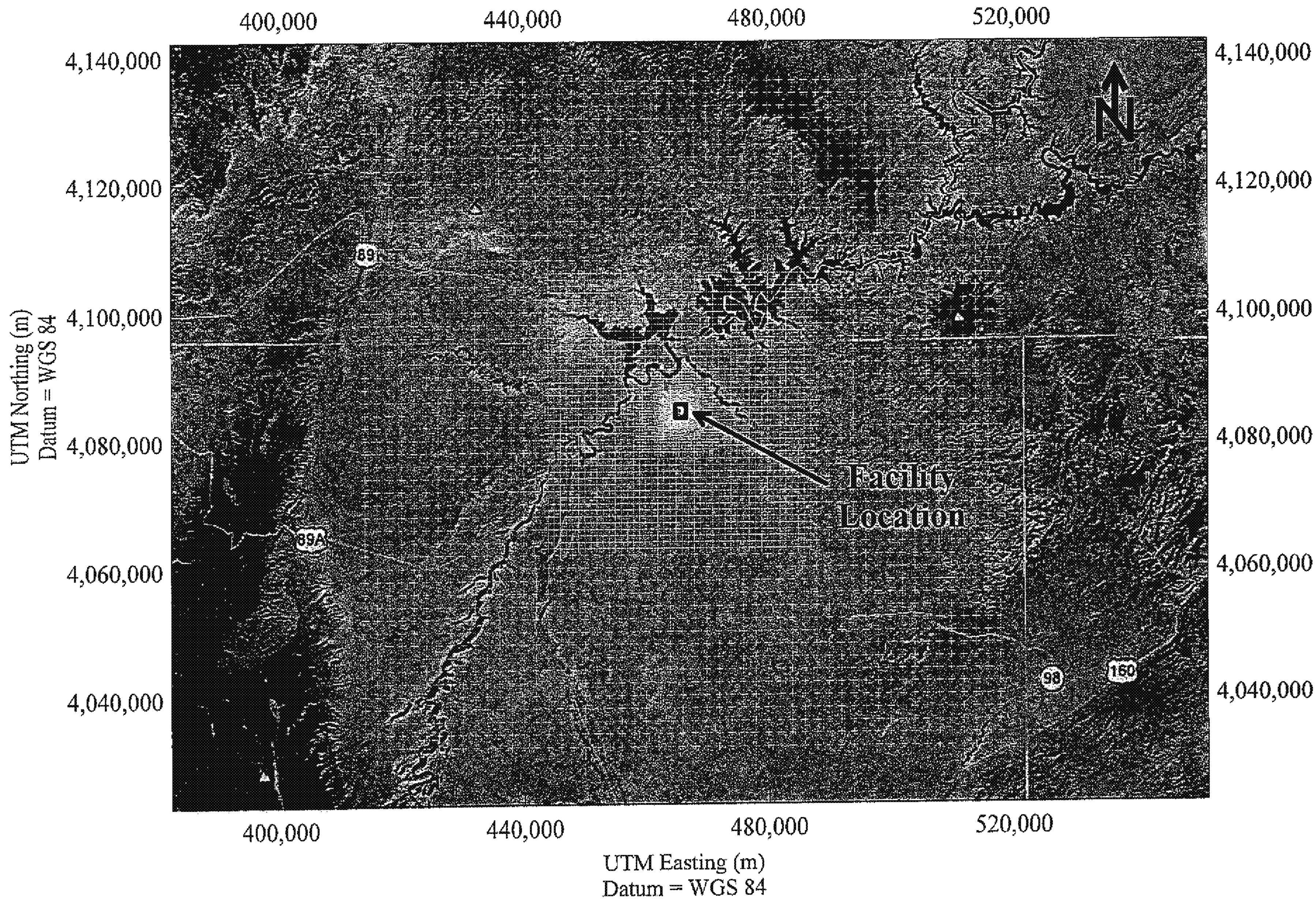
Four receptor grids were used covering a region that extends 50 km beyond the NGS fenceline. Note that all receptor coordinates were established using the UTM WGS84 coordinate system. The primary receptor grids include the following:[11]

1. The "fenceline grid" is a discrete receptor grid with the receptors spaced at 25 meter intervals along the fenceline.
2. The "fine grid" contains 100-meter spaced receptors extending approximately 1,500 meters from the fenceline, excluding the receptors within the fenceline.
3. The "medium grid 1" contains 200-meter spaced receptors located between 1,000 and 2,500 meters from the fenceline.
4. The "medium grid 2" contains 500-meter spaced receptors located between 2,500 and 5,000 meters from the fenceline.
5. The "coarse grid1 " contains 1,000-meter spaced receptors located between 5,000 and 20,000 meters from the fenceline.
6. The "coarse grid 2" contains 2,000-meter spaced receptors located between 20,000 and 50,000 meters from the fenceline.

Figure 3-1 presents the NGS receptor grid. The receptor grid elevations and scaling heights were calculated using AERMAP based on USGS NED 1 arc second data files.

[11] Per Arizona Department of Environmental Quality, *Air Dispersion Modeling Guidelines for Arizona Air Quality Permits*, Section 3.6, September 23, 2013.

Figure 3-1. Receptor Grid



4. EMISSIONS MODELED & SOURCE CHARACTERIZATION

The following sections discuss the emission sources included in the modeling demonstration. Details of modeled emission rates and source parameters are contained in Appendix A.

4.1. EMISSIONS MODELED

Emission increases of PM_{10} and $PM_{2.5}$ from the proposed project were considered in this modeling analysis. A list of emission sources included in this modeling analysis is as follows:

- Coal Handling Dust Collection System 2500 (model ID DC12)
- Coal Handling Dust Collection System 3500 (model ID DC13)
- Cement Kiln Dust Silo 1 (model ID DC14)
- Cement Kiln Dust Silo 2 (model ID DC15)
- Cement Kiln Dust Silo 3 (model ID DC16)
- Cement Kiln Dust Day Bin 1 and 2 (model ID DC1718)
- Unpaved roads associated with cement kiln dust deliveries and calcium bromide deliveries

For each modeled emission source, the potential to emit associated with the proposed project was modeled. Daily emission rates were used to predict 24-hour modeled concentrations, and annual emission rates were used to predict annual modeled concentrations. Details of modeled emission rates are included in Appendix A.

Note that although the proposed project will result in an increases in actual emissions from Boilers U1, U2, and U3. NGS is not proposing to increase the potential emissions from these boilers. Therefore, Boilers U1, U2, and U3 were not included in this modeling analysis.

4.2. SOURCE CHARACTERIZATION

The following sections provide the details associated with characterizing the emission sources into various AERMOD model source representations. Note that all modeled source coordinates were established using the UTM WGS84 coordinate system.

4.2.1. Point Sources

The two coal handling dust collection systems (DC12 and DC13) were modeled as point sources with the appropriate stack parameters (i.e., stack height, diameter, exit velocity, and exit temperature). The dust collection systems exhaust at ambient temperature and thus were modeled at 0 Kelvin, which flags the model to use the ambient temperature from the meteorological data as the exit temperature. Details of modeled source parameters are contained in Appendix A.

4.2.2. Horizontal Point Sources

The three cement kiln dust silos (DC14, DC15 and DC16) release horizontally and therefore were modeled as horizontal point sources. These silos exhaust at ambient temperature and thus were modeled at 0 Kelvin, which flags the model to use the ambient temperature from the meteorological data as the exit temperature. Details of modeled source parameters are contained in Appendix A.

4.2.3. Volume Sources

4.2.3.1. Volume Sources - Cement Kiln Dust Day Bins

Cement Kiln Dust Day Bins 1 and 2 are located in the Refined Coal Building, and the release characteristics are determined based on building dimensions, with details as follows:

- Release height = building height / 2
- Initial lateral dimensions (σ_{yo}) for single volume source = building length / 4.3
- Initial vertical dimensions (σ_{zo}) for elevated source on or adjacent to a building = building height / 2.15

Modeled emission rate is the sum of emission rate for Cement Kiln Dust Day Bins 1 and 2. Details of modeled emission rates and source parameters are contained in Appendix A.

4.2.3.2. Volume Sources - Unpaved Roads

The unpaved roads were modeled as a series of adjacent volume sources. Source parameters were determined following the eight steps contained in ADEQ modeling guideline.[12]

- Step 1: adjusted width of road = actual road width (6 meters) + 6
- Step 2: number of volume source N = road length / adjusted road width
- Step 3: height of volume = 1.7 x vehicle height (12 ft)
- Step 4: initial horizontal sigma (σ_{yo}) = adjusted road width / 2.15
- Step 5: initial vertical sigma (σ_{zo}) = volume height / 2.15
- Step 6: release height = volume height / 2
- Step 7: emission rate per volume source = total emission rate / number of volume source
- Step 8: UTM coordinate

Details of modeled emission rates and source parameters are contained in Appendix A.

[12] Arizona Department of Environmental Quality, *Air Dispersion Modeling Guidelines for Arizona Air Quality Permits*, Section 3.3.5, September 23, 2013.

5.1. SIGNIFICANT IMPACT ANALYSIS RESULTS

Table 5-1 presents the summary of the results from the Significant Impact Analysis. Plots contained in Appendix B depict locations of the maximum modeled concentrations. As shown in Table 5-1, the maximum modeled ground level concentrations for 24-hour and annual $PM_{2.5}$ and PM_{10} are below the SILs. As discussed in Section 2.2, although the $PM_{2.5}$ SIL has been vacated, per EPA's Draft Guidance for $PM_{2.5}$ Permit Modeling [13], no Full Impact Analysis is needed if the following two conditions are met:

- The differences between the NAAQS and background concentrations are greater than the $PM_{2.5}$ SIL; and
- The modeled concentrations from the project emission increases are below the $PM_{2.5}$ SILs.

As shown in Table 2-2, the differences between NAAQS and background concentrations for $PM_{2.5}$ are greater than the SILs.

Therefore, no Full Impact Analysis is required and the proposed project is not expected to cause any violation to NAAQS or PSD Increment.

[13] U.S. EPA, Draft Guidance for $PM_{2.5}$ Permit Modeling, March 4, 2013

Table 5-1. Significant Impact Analysis Results

Pollutant	Averaging Period	Design Value	Model Year	Modeled Concentration Total (µg/m³)	Modeled Concentration Maximum in 5 Years (µg/m³)	SIL (µg/m³)
PM_{10}	24-Hour	H1H	2008	4.24	4.24	5
		H1H	2009	3.50		
		H1H	2010	3.28		
		H1H	2011	3.54		
		H1H	2012	3.89		
	Annual	H1H	2008	0.60	0.60	1
		H1H	2009	0.53		
		H1H	2010	0.44		
		H1H	2011	0.45		
		H1H	2012	0.48		
$PM_{2.5}$	24-Hour	H1H	2008	0.23	0.23	1.2
		H1H	2009	0.19		
		H1H	2010	0.19		
		H1H	2011	0.20		
		H1H	2012	0.22		
	Annual	H1H	2008	0.04	0.04	0.3
		H1H	2009	0.03		
		H1H	2010	0.03		
		H1H	2011	0.03		
		H1H	2012	0.03		

6. ELECTRONIC FILES

The compact disk (CD) provided in this section contains all of the AERMOD air dispersion modeling analyses electronic input, output, and other files used to generate the results presented in this report. The meteorological data and downwash files that are used in the modeling analysis are also included on the CD. The following is a list of files that are included on the CD:

- All AERMOD input, output, and plot files
- AERMOD meteorological data files
- AERMET data files
- AERMAP terrain data files
- All BPIP/BPIPP input and output files

Appendix C contains a detailed list of files included on the CD, along with the description for each file.

APPENDIX A. MODELED EMISSION RATES AND SOURCE PARAMETERS

APPENDIX A. MODELED EMISSION RATES AND SOURCE PARAMETERS

Table A-1. Model Setup - Point Sources

Model ID	Description	Emission Rate [1]				Stack Height [2]	Stack Temperature [2]	Stack Velocity [2]	Stack Diameter [2]
		PM_{10}		$PM_{2.5}$					
		Daily (lb/day)	Annual (tpy)	Daily (lb/day)	Annual (tpy)	(ft)	(F)	(acfm)	(ft)
DC12	Coal Handling Dust Collection System 2500	10.18	1.86	0.54	0.10	12.00	Ambient	16,500	3.17
DC13	Coal Handling Dust Collection System 3500	3.70	0.68	0.20	0.04	12.00	Ambient	6,000	2.17
Model ID	**Description**	**Emission Rate**				**Stack Height**	**Stack Temperature**	**Stack Velocity**	**Stack Diameter**
		PM_{10}		$PM_{2.5}$					
		Daily (g/s)	Annual (g/s)	Daily (g/s)	Annual (g/s)	(m)	(K)	(m/s)	(m)
DC12	Coal Handling Dust Collection System 2500	5.3459E-02	5.3459E-02	2.8333E-03	2.8333E-03	3.66	0	10.64	0.97
DC13	Coal Handling Dust Collection System 3500	1.9440E-02	1.9440E-02	1.0303E-03	1.0303E-03	3.66	0	8.27	0.66

[1] All emissions rates per "NGS - Refined Coal Permit Revision - Emission Calculations 2014-11-11.xlsx" provided in the email from Kyle Heckel on 11/11/2014

[2] For Coal Handling Dust Collection Systems 2500 and 3500, source parameters are based on manufacture specifications.

APPENDIX A. MODELED EMISSION RATES AND SOURCE PARAMETERS

Table A-2. Model Setup - Horizontal Point Sources

Model ID	Description	Emission Rate [1]				Stack Height [2]	Stack Temperature [2]	Stack Velocity [2]	Stack Diameter [2]
		PM_{10}		$PM_{2.5}$					
		Daily (lb/day)	Annual (tpy)	Daily (lb/day)	Annual (tpy)	(ft)	(F)	(acfm)	(ft)
DC14	Cement Kiln Dust Silo 1	0.023	0.0042	0.0012	0.00022	66.00	Ambient	450	0.81
DC15	Cement Kiln Dust Silo 2	0.023	0.0042	0.0012	0.00022	66.00	Ambient	450	0.81
DC16	Cement Kiln Dust Silo 3	0.023	0.0042	0.0012	0.00022	66.00	Ambient	450	0.81
Model ID	Description	Emission Rate				Stack Height	Stack Temperature	Stack Velocity	Stack Diameter
		PM_{10}		$PM_{2.5}$					
		Daily (g/s)	Annual (g/s)	Daily (g/s)	Annual (g/s)	(m)	(K)	(m/s)	(m)
DC14	Cement Kiln Dust Silo 1	1.2150E-04	1.2150E-04	6.4394E-06	6.4394E-06	20.12	0	4.40	0.25
DC15	Cement Kiln Dust Silo 2	1.2150E-04	1.2150E-04	6.4394E-06	6.4394E-06	20.12	0	4.40	0.25
DC16	Cement Kiln Dust Silo 3	1.2150E-04	1.2150E-04	6.4394E-06	6.4394E-06	20.12	0	4.40	0.25

[1] All emissions rates per "NGS - Refined Coal Permit Revision - Emission Calculations 2014-11-11.xlsx" provided in the email from Kyle Heckel on 11/11/2014

[2] For Cement Kiln Dust Silo 1 to 3, source parameters are based on "NGS - Refined Coal Permit Revision - Emission Calculations 2014-11-11.xlsx" provided in the email from Kyle Heckel on 11/11/2014

Table A-3. Model Setup - Volume Sources - Day Bins

Model ID	Description	Emission Rate [1]				Building Height	Building Length	
		PM_{10}		$PM_{2.5}$				
		Daily (lb/day)	Annual (tpy)	Daily (lb/day)	Annual (tpy)	(m)	(m)	
DC1718	Cement Kiln Dust Day Bin 1 and 2	0.99	0.18	0.05	0.0096	11.43	11.13	
Model ID	Description	Emission Rate				Release Height [2]	Init. Lat. Dim. [2]	Init. Vert. Dim. [2]
		PM_{10}		$PM_{2.5}$				
		Daily (g/s)	Annual (g/s)	Daily (g/s)	Annual (g/s)	(m)	(m)	(m)
DC1718	Cement Kiln Dust Day Bin 1 and 2	5.1839E-03	5.1839E-03	2.7475E-04	2.7475E-04	5.72	2.59	5.32

[1] All emissions rates per "NGS - Refined Coal Permit Revision - Emission Calculations 2014-11-11.xlsx" provided in the email from Kyle Heckel on 11/11/2014

[2] Cement Kiln Dust Day Bins 1 and 2 are located in the Refined Coal Building, and the release characteristics are determined based on building dimensions:
Release height = building height / 2
Initial lateral dimensions (σyo) for single volume source = building length / 4.3
Initial vertical dimensions (σzo) for elevated source on or adjacent to a building = building height / 2.15

Table A-4. Model Setup - Roads

Step	Parameter	Value	Units
Road Parameters[1]			
1	2 lane roadway actual width	6	m
	adjusted width	12	m
2	length of roadway	816	m
	number of volume sources	68	
3	height of vehicle	3.66	m
	volume source height	6.22	m
4	initial horizontal sigma	5.58	m
5	initial vertical sigma	2.89	m
6	release height	3.11	m
Total number of volume source		68	
Total Road Emissions			
PM_{10} 24-hour averaging emission rate - total		1.98	lb/day
PM_{10} annual emission rate - total		0.28	tpy
$PM_{2.5}$ 24-hour averaging emission rate - total		0.20	lb/day
$PM_{2.5}$ annual emission rate -total		0.03	tpy
Road Emissions per Volume Source			
PM_{10} 24-hour averaging emission rate per volume source		1.5286E-04	g/s
PM_{10} annual emission rate per volume source		1.1943E-04	g/s
$PM_{2.5}$ 24-hour averaging emission rate per volume source		1.5286E-05	g/s
$PM_{2.5}$ annual emission rate per volume source		1.1943E-05	g/s

[1] Road source parameters were determined following the procedures contained in ADEQ modeling guideline (September 2013)

Table A-5. Model Setup - Volume Sources - Roads

Model ID	Description	Emission Rate [1]				Release Height [1]	Init. Lat. Dim. [1]	Init. Vert. Dim. [1]
		PM_{10}		$PM_{2.5}$				
		Daily (g/s)	Annual (g/s)	Daily (g/s)	Annual (g/s)	(m)	(m)	(m)
UR01	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR02	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR03	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR04	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR05	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR06	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR07	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR08	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR09	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR10	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR11	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR12	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR13	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR14	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR15	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR16	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR17	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR18	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR19	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR20	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR21	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR22	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR23	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR24	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR25	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR26	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR27	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR28	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR29	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR30	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR31	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR32	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR33	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR34	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR35	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR36	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89

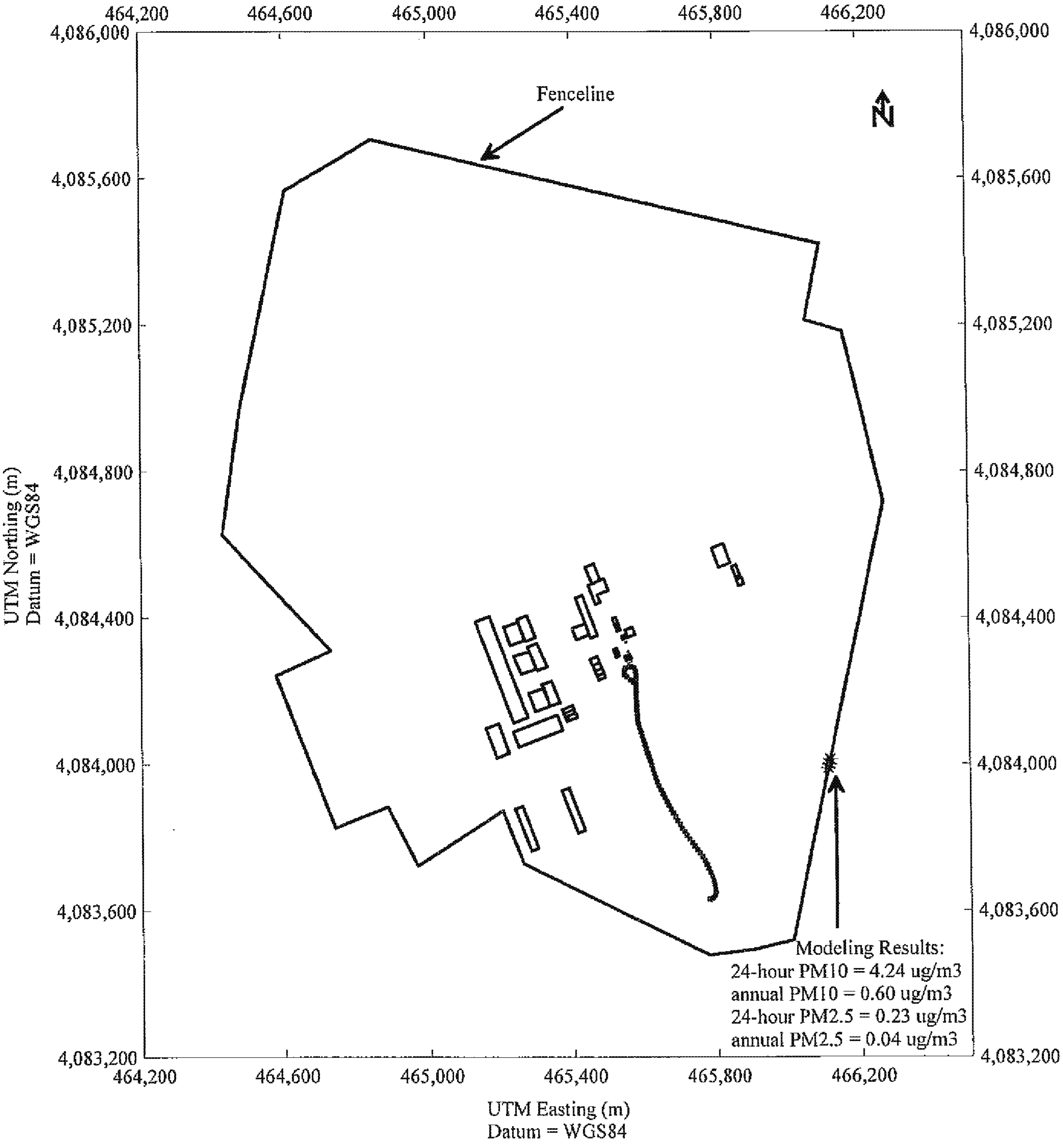
Table A-5. Model Setup - Volume Sources - Roads

Model ID	Description	Emission Rate [1]				Release Height [1]	Init. Lat. Dim. [1]	Init. Vert. Dim. [1]
		PM_{10}		$PM_{2.5}$				
		Daily (g/s)	Annual (g/s)	Daily (g/s)	Annual (g/s)	(m)	(m)	(m)
UR37	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR38	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR39	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR40	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR41	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR42	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR43	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR44	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR45	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR46	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR47	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR48	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR49	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR50	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR51	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR52	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR53	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR54	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR55	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR56	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR57	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR58	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR59	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR60	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR61	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR62	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR63	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR64	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR65	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR66	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR67	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89
UR68	unpaved road	1.5286E-04	1.1943E-04	1.5286E-05	1.1943E-05	3.11	5.58	2.89

[1] Determined in Table A-4.

APPENDIX B. MODEL RESULT GRAPHICS

Appendix B. Modeling Results



APPENDIX C. LIST OF MODELING FILES INCLUDED ON CD

Appendix C. List of Modeling Files Included on CD

Pollutant	File Name	Description
		Meteorological Data
--	KPGA.5Y.PFL KPGA.5Y.SFC	Meteorological Data - profile file. Meteorological Data - surface file.
		National Elevation Dataset Data
--	NED_05700372.tif	NED data files.
		AERMAP Files
--	AERMAP.inp AERMAP.rec AERMAP.src	AERMAP input file AERMAP file for receptor elevation AERMAP file for source and building elevation
		BPIP Files
--	BPIP.inp BPIP.out BPIP.sum	BPIP input file BPIP output file BPIP summary file
		AERMOD Model Files
PM10	PM10.24HR.VE.YEAR.ami PM10.24HR.VE.YEAR.aml PM10.24HR.VE.YEAR.plt	AERMOD input file for 24-hour PM10 for each year (from 2008 to 2012) AERMOD output file for 24-hour PM10 for each year (from 2008 to 2012) AERMOD plot file for 24-hour PM10 for each year (from 2008 to 2012)
PM10	PM10.ANN.VE.YEAR.ami PM10.ANN.VE.YEAR.aml PM10.ANN.VE.YEAR.plt	AERMOD input file for annual PM10 for each year (from 2008 to 2012) AERMOD output file for annual PM10 for each year (from 2008 to 2012) AERMOD plot file for annual PM10 for each year (from 2008 to 2012)
PM2.5	PM25.24HR.VE.YEAR.ami PM25.24HR.VE.YEAR.aml PM25.24HR.VE.YEAR.plt	AERMOD input file for 24-hour PM2.5 for each year (from 2008 to 2012) AERMOD output file for 24-hour PM2.5 for each year (from 2008 to 2012) AERMOD plot file for 24-hour PM2.5 for each year (from 2008 to 2012)
PM2.5	PM25.ANN.VE.YEAR.ami PM25.ANN.VE.YEAR.aml PM25.ANN.VE.YEAR.plt	AERMOD input file for annual PM2.5 for each year (from 2008 to 2012) AERMOD output file for annual PM2.5 for each year (from 2008 to 2012) AERMOD plot file for annual PM2.5 for each year (from 2008 to 2012)

APPENDIX D

Equipment Specifications

MAC Equipment Inc.
P.O. Box 205 • Sabetha, KS 66534
888.821.2476 sales • 877.821.7378 service • www.macequipment.com

Air Permit Work Sheet for MAC AVSC Dust Collector

Dust Collector Model No.	39AVSC25			
Type of Collector	SILO			
Cleaning Mechanism	pulse jet w/ adjustable timer			
Fan Included	No			
Fan Power	n/a	hp		
Collector Flow Rate-max rating	2,500	acfm		
Filter Material	Spun Bond polyester			
Filter Efficiency	99.92			
Filter Media Max Pressure Drop	8	in H_2O		
Total Area of Filter Media	900	sqft		
Nominal Filter Diameter	6	in		
Nominal Filter Length	3.25	ft		
Quantity of Filters	25			
Number of Compartments	1			
Number of Filters per Compartment	25			
Filtering Velocity	1.33	acfm / ft2 of		
Application Flow Rate	1200	acfm		
Type of Particulate Controlled	LIME &CEMENT KILN DUST			
Name of Source(s) or Equipment being Controlled	SILO			
	inlet		outlet	
Particulate Grain Loading	2.5E+00	grains / scf	2.00E-03	grains / scf
Outlet Area	0.55	ft2		
Outlet Velocity	36.67	ft / s		

C&W Manufacturing & Sales Co.
P.O. Box 908 • Crowley, TX 76036
817.783.5000 tel • 817.783.2353 fax
info@cwmfg.com • www.cwmfg.com

Air Permit Work Sheet for C&W Dust Collector

Dust Collector Model No.	CP-LPR-8-S			
Type of Collector	SILO			
Cleaning Mechanism	pulse jet w/ adjustable timer			
Fan Included	n			
Fan Power	na	hp		
Collector Flow Rate-max rating	2,340	acfm		
Filter Material	Spun Bond polyester			
Filter Efficiency	99.99			
Filter Media Max Pressure Drop	12	in h_2o		
Total Area of Filter Media	356	sqft		
Nominal Filter Diameter	8	in		
Nominal Filter Length	3.25	ft		
Quantity of Filters	8			
Number of Compartments	1			
Number of Filters per Compartment	8			
Filtering Velocity	1.26	acfm / ft^2 of cloth		
Application Flow Rate	450	acfm		
Type of Particulate Controlled	LIME &CEMENT KILN DUST			
Name of Source(s) or Equipment being Controlled	SILO			
	inlet		outlet	
Particulate Grain Loading	2.5E+00	grains / scf	2.50E-04	grains / scf

Outlet Area	0.52	ft^2
Outlet Velocity	14.42	ft / s

Aircon

CORPORATION

PO Box 80446
Memphis, TN 38108

Dust Collection Systems
Filtration Equipment
Pneumatic Conveying
Steel Fabricators-Erectors

May 1, 2014

Dylan Rohar
Process Engineer
Forge Group North America
Phone 724-754-9626
4000 Town Center Blvd
Canonsburg , PA 15317
Dylan.rohar@forgegroup.com

Re: Emissions for Aircon high-efficient baghouses (Aircon quote DP-11236-R2)

Dear Mr. Rohar:

Below is a summary of the forecast emissions for the Aircon baghouses requoted for the Salt River Project in Page, AZ, (Aircon quote DP-11236-R2).

Baghouse Emissions for High-efficient Bags

We will guarantee the maximum particulate emission concentration for any Aircon fabric filter baghouse with high-efficiency (micro-denier) bags 16 oz. polyester bags to be a maximum of 0.003 grains per cubic foot. This is valid for any new fabric, and under normal wear this is valid for up to at least one year of service. During normal operation (for a typical loadings of about 3 to 7 grains per cubic foot), this outlet concentration should translate to a PM (particulate matter) efficiency of about 99.90% to 99.97% by weight.

Also, it should be noted that a baghouse is nearly 100% efficient in capturing particulate 10 microns and larger. Therefore, because the PM that escapes the unit is all under ten microns, the PM-10 emissions are the same as the (overall) PM emissions.

To estimate the particulate emissions, multiply 0.003 [grains/cu ft] by both the capacity [cfm] and the amount of time the baghouse filter is in operation during a year.

For example, for a system with a total of 6,000 [cfm], the emissions for each hour of operation, and also on an annual (8,760 hr/yr) basis, are as follows:

$$\frac{0.003 \text{ grains}}{1 \text{ cu ft}} * \frac{6{,}000 \text{ cu ft}}{\text{min}} * \frac{60 \text{ min}}{\text{hr}} * \frac{1 \text{ lb}}{7000 \text{ grains}} = 0.1542 \text{ [lb/hr]}$$

$$\frac{0.154 \text{ lbs}}{\text{hr}} * \frac{24 \text{ hrs}}{\text{day}} * \frac{365 \text{ days}}{\text{year}} * \frac{1 \text{ short ton}}{2000 \text{ lbs}} = 0.68 \text{ [tons/yr]}$$

Chart of System Emissions

The proposed system will include a Baghouse #2500 for 16,500 cfm, and Baghouse #3500 with an additional 6,000 cfm.

As a breakdown for each system as quoted on DP-11236-R2, the PM emissions for each system are totaled below:

High-efficiency (micro-denier) polyester bags

Unit	*System*	*CFM*	*Emissions*	*lbs/hr*	*hr/year*	*tons/yr*
2500	11.5RAW196-10	16,500	0.003	0.42	8760	1.86
3500	8RAW100-10	6,000	0.003	0.15	8760	0.68
	Subtotals	*22,500*		*0.58*		***2.53***

The total PM or PM-10 emissions for all systems are 2.53 tons/year for high-efficiency bags.

If you have any questions, please call any time.

Sincerely,
Aircon Corporation

Jeffrey A. Talley

Jeffrey A. Talley, P.E.